CHAPTER VI
SUMMARY AND CONCLUSION

The present investigation on brinjal (Solanum melongena L.) was undertaken with a view (i) to study the nature and magnitude of heterosis (ii) to estimate the general and specific combining ability of parents and crosses, respectively (iii) to understand the nature and magnitude of gene action involved in the inheritance of fruit yield and its component traits.

The experimental material comprised of 9 parents and their 36 F$_1$’s derived by crossing nine different genotypes of brinjal GJB-2, GLJB-4, GOB-1, JBR-15-01, JBW-15-06, JBR-15-08, JBR-15-11, JBL-10-08-07 and Pant Rituraj in a diallel fashion excluding reciprocals. The experiment was laid out in a randomized block design with three replications during late kharif-2016-17 at Vegetable Research Station, Junagadh Agricultural University, Junagadh. The observations were recorded on 15 different characters viz., Days to 50 % flowering, days to first picking, fruit length, average fruit weight (gm), fruit girth (cm), number of fruits per plant, number of primary branches per plant, plant height (cm), total fruit yield per plant (gm), number of picking, days to last picking, total phenol (mg/100gm), total soluble solids, fruit borer infestation (%) and shoot borer infestation (%).

The data were statistically analyzed for combining ability approach utilizing Method-2, Model-I of Griffing (1956a). The genetic components of variation were calculated as per the method suggested by Hayman (1954) and heterosis as suggested by Fonseca and Patterson (1968).

The important findings as emerged from the present investigation are summarized as under.

1. The analysis of variance for experimental design revealed that mean square due to genotypes, parents, hybrids (except average fruit weight) and parents Vs hybrids (except days to first picking and days to last picking) were found significant for all the traits indicating sufficient amount of genetic variability present in material used.

2. An examination of mean values for different characters revealed that GJB-2, GJLB-4 and Pant Rituraj were the earliest parents, while Pant Rituraj, JBR-15-
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11 and GJB-2 were the high yielding parents and were also good for various fruit yield attributing traits.

3. A marked degree of useful and significant heterosis over better and standard check (GJBH-4) was observed in individual crosses for different traits.

4. The magnitude for heterosis was high for days to 50% flowering, plant height and total soluble solids; moderate for fruit length, number of fruits per plant, total fruit yield per plant, fruit borer infestation and shoot borer infestation and low for days to first picking, average fruit weight, number of primary branches per plant, total number of picking, days to last picking and total phenol.

5. The high, significant and positive standard heterosis for fruit yield per plant and some of its component traits were recorded in the crosses, JBL-10-08-07 x Pant Rituraj, GJB-2 x JBR-15-01, GJB-2 x JBR-15-08, GJLB-4 x JBR-15-08 and JBR-15-08 x JBL-10-08-07. Such crosses could be exploited for practical heterosis breeding programme in brinjal.

6. The analysis of variance for combining ability revealed that mean square due to GCA and SCA (except days to first picking) were significant for all the characters. This indicated that both additive and non-additive type of gene effects played a vital role in the inheritance of all these traits under present studied. The magnitude of GCA and SCA variances revealed that the SCA variances were higher than their respective GCA variances for all the characters except for days to first picking. This was also supported by less than unit potence ratio which confirmed the preponderance of non-additive gene action for all the traits except for days to first picking.

7. The estimate of gca effect indicated that the parents GJB-2 and Pant Rituraj were found to be the good general combiners for fruit yield and some of the yield attributing characters. For the characters related to earliness viz., days to 50% flowering and days to first picking, Pant Rituraj was found to be good combiner; for fruit length, JBR-15-08, GJLB-4 and JBR-15-11 was found to be good combiner and for fruit girth parents JBL-10-08-07, Pant Rituraj and JBW-15-06 were found to be good combiner.

8. It was observed that per se performance of parents for majority of characters, in general, related to their gca effects. Parents which exhibited significant gca effect for fruit yield per plant also possessed high and significant gca effects for some of the yield components.
9. The cross combinations viz., GJLB-4 x JBR-15-08, JBL-10-08-07 x Pant Rituraj and GJB-2 x JBR-15-01 were found to be good specific cross combination for fruit yield per plant. Crosses showing high sca effects for fruit yield also depicted high sca effects for important yield attributes, accompanied by high to moderate heterotic response. Crosses with high sca effect in fruit yield per plant were in combinations of poor x good or average x average general combiners.

10. The estimate of components of variation revealed significant results for D, H1 and H2 for all the characters indicating importance of both additive and non-additive gene effects for the expression of various characters. However, dominance component was higher in magnitude than additive component for all the characters (except for days to first picking), which revealed predominance of dominance effect in the expression of such traits.

11. Average degree of dominance was found to be over dominance for all the traits except partial dominance for days to first picking indicating the predominant role of non-additive genetic system for most of the traits.

12. Asymmetrical distribution of positive and negative genes in the parents was observed for all the traits.

13. Greater proportion of recessive genes was observed than dominant genes for plant height. For rest of traits, greater proportion of dominant genes was observed as compared recessive genes.

14. High estimates of heritability in narrow sense was observed for days to 50 % flowering and fruit length suggesting that selection based on these attribute would lead to rapid improvement. Moderate heritability was also observed for days to first picking, fruit girth, number of fruits per plant, number of primary branches per plant, plant height and total fruit yield per plant, whereas average fruit weight, total number of picking, days to last picking, total phenol, total soluble solids, fruit borer infestation and shoot borer infestation displayed low heritability.

15. The present investigation indicated that both additive and non-additive types of gene actions were important in governing all the traits with preponderance of non-additive gene action for fruit yield and its components. This indicated that improvement in fruit yield and its attributes in brinjal may be expected through hybridization followed by standard selection procedures and
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biparental mating, intermating of elite segregants and postponding the selection up to later generations should be followed, which meets the requirement of utilizing both types of gene actions.

CONCLUSION

On the basis of per se performance, heterotic response, combining ability estimate and gene action involved in the expression of fruit yield and its components, the five crosses vīz., JBL-10-08-07 x Pant Rituraj, GJB-2 x JBR-15-01, GJB-2 x JBR-15-08, GJLB-4 x JBR-15-08, JBR-15-08 x JBL-10-08-07 appeared to be most superior. These hybrids recorded 60.85, 57.74, 52.21, 52.21 and 37.96 per cent higher yield over standard check (GJBH-4) and show significant sca effects in desirable direction for fruit yield and its attributing traits. Therefore, these five crosses could be exploited for heterosis breeding programme to boost the fruit yield in brinjal. Moreover, parents vīz., GJB-2 and Pant Rituraj was found good general combiner for total fruit yield per plant and they were also reflected in top three standard heterotic crosses. Hence, these parents could be utilized in future breeding programme.